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BELT WITH INTEGRALLY MOLDED TEETH AND VANES

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Our invention relates to a toothed belt and more particularly to a molded plastic toothed belt especially adapted for use in a merchandising machine.

There are known in the prior art toothed belts formed of flexible material such, for example, as rubber which are driven by sprocket wheels so as to be moved through a predetermined distance for a given rotation of the wheel. In order that these belts perform their intended function of moving through a predetermined distance in response to rotary displacement of the driving wheel they must be dimensionally stable and they must be sufficiently flexible to travel around the supporting wheels without cracking.

Attempts have been made in the prior art to use belts of the general type described above in merchandising machines to advance articles of merchandise such, for example, as food toward a delivery chute. It will readily be appreciated that in a merchandising machine the most efficient use of the space inside the machine cabinet requires that the maximum portion of the space consistent with the dispensing operation be used to store articles to be sold. For this reason in a merchandise machine in which a belt is used to advance articles toward the delivery chute the belt may be provided with pushers which, in response to movement of the belt, advance articles carried by a support disposed below the belt along the support and up around a guide to the top of the belt which carries the articles to the delivery chute. Alternatively a vertical belt having carriers can be used. Stated otherwise, for efficient use of the merchandising machine cabinet space the operating parts of the article delivery mechanism should occupy the least amount of space within the cabinet. Consistent with this desideratum the sprocket wheel which drives the belt should be of a small diameter.

In order to provide a belt in the prior art which will fulfill the necessary requirements for a merchandising machine of the type described above, it has been suggested that belts of a highly flexible material be provided with upstanding pushers or carriers of a material which is sufficiently rigid to advance or support the articles. If the pushers were made of the same material as the belt they would not be rigid enough to advance the articles as required. A belt formed of a material stiff enough to advance the articles could not be trained around the small diameter driving wheel without cracking. As an alternative to the construction just described, the belt could be made from sections of relatively rigid material connected by hinge assemblies. It will be readily apparent to those skilled in the art that the construction of belts of this nature is extremely difficult and complicated and for this reason is expensive. As a matter of fact, belts of this type may be so expensive as to prohibit their use on a merchandising machine which must be sold in a competitive market.

We conceived the idea of molding a belt integrally with pushers for advancing articles in the manner described above. Having conceived this idea, extensive experiments were made in an attempt to arrive at a belt configuration which would fulfill the necessary requirements. Attempts to mold a belt which was thin enough to permit it to be trained around a small diameter wheel

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without cracking proved unsuccessful since the plastic material cooled too rapidly and thus did not fill the mold. We then arrived at the concept of molding a belt of a sufficient thickness to permit the plastic to fill the mold before cooling while providing relatively thin lines or areas of plastic extending across the belt on each side of every tooth to permit the belt to flex in these areas. We discovered that these relatively confined areas could be filled with plastic in the course of the molding operation without the danger of "freezing" the material.

Having arrived at a suitable design for the plastic belt, extensive experiments were conducted to determine what material, if any, would be suitable for forming the belt. Our investigation revealed the surprising and unexpected fact that polypropylene possesses a unique combination of properties which make it suitable for the formation of our belt.

We have invented an integrally molded toothed belt which is especially adapted for use in merchandising machines. Our belt can be trained around a driving roller or wheel of small diameter without cracking. Our belt includes integrally formed pushers which are sufficiently rigid to advance articles of merchandise along a support and up around a guide. Our toothed belt can be produced more rapidly and expeditiously and at less cost than are belts of the prior art carrying pushers.

One object of our invention is to provide an integrally molded toothed belt especially suited for use in a merchandising machine.

Another object of our invention is to provide an integrally molded toothed belt having pushers sufficiently rigid to advance and to support an article of merchandise.

A further object of our invention is to provide an integrally molded toothed belt adapted to be trained around a driving wheel having a small diameter without cracking.

A still further object of our invention is to provide an integrally molded toothed belt having pushers which is less expensive to produce than are belts of the prior art carrying pushers.

Other and further objects of our invention will appear from the following description.

In general our invention contemplates the provision of an integrally molded toothed belt having molded hinges formed by areas of reduced thickness forming hinges on each side of every one of a number of teeth extending across the belt at spaced locations on one side thereof and having spaced pushers extending from the other side of the belt. We mold our belt from polypropylene plastic having a unique combination of properties making it especially suitable for our belt.

In the accompanying drawings to which reference is made in the instant specification and in which like reference characters indicate like parts in the various views:

FIGURE 1 is a fragmentary perspective view of a merchandising machine provided with our toothed belt.

FIGURE 2 is a fragmentary sectional view of the delivery end of the form of our toothed belt adapted to be used in a merchandising machine.

FIGURE 3 is a fragmentary sectional view of the form of our toothed belt shown in FIGURE 2 taken along the line 3—3 of FIGURE 2.

FIGURE 4 is a perspective view of an alternate form of our toothed belt in which no pushers are provided.

FIGURE 5 is a fragmentary sectional view of an alternate form of merchandising machine provided with an alternate form of our toothed belt.

FIGURE 6 is a fragmentary elevation with parts in section of the form of belt used in the machine illustrated in FIGURE 5.

FIGURE 7 is a fragmentary sectional view of the